Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1.(currently amended) A method for forming an MTJ memory cell having a substantially circular horizontal cross-section, wherein a ferromagnetic free layer in said cell has uniaxial magnetic anisotropy provided by exchange coupling with [[an]] a top antiferromagnetic layer formed thereon comprising:

providing a substrate;

forming on said substrate a layered magnetic tunneling junction (MTJ) structure, said formation further comprising:

forming on said substrate a seed layer;

forming on said seed layer ~~a bottom~~ an antiferromagnetic pinning layer;

forming on said ~~bottom~~ antiferromagnetic pinning layer a synthetic antiferromagnetic (SyAF) pinned layer;

forming on said pinned layer a tunneling barrier layer;

forming on said tunneling barrier layer a ferromagnetic free layer;

forming on said ferromagnetic free layer [[a]] said top antiferromagnetic layer;

forming on said top antiferromagnetic layer a capping layer;

annealing said layered MTJ structure in an external magnetic field, thereby pinning said SyAF layer and exchange coupling said top antiferromagnetic layer to said ferromagnetic free layer to produce, thereby, a uniaxial magnetic anisotropy in said free layer;

patterning said layered MTJ structure to create a horizontal cross-sectional shape that is substantially circular.

2.(original) The method of claim 1 wherein said seed layer is a layer of NiFe, NiCr, NiFeCr, Cu, Ti, Ta, Ru, Rh, TiN, TiW, W or TaW formed to a thickness between approximately 5 and 500 angstroms.

3.(currently amended) The method of claim 1 wherein said ~~bottom~~ antiferromagnetic pinning layer is a layer of the antiferromagnetic material IrMn, RhMn, RuMn, OsMn, FeMn, FeMnCr, FeMnRh, CrPtMn, TbCo, NiMn, PtMn or PtPdMn and it is formed to a thickness between approximately 40 and 400 angstroms.

4.(currently amended) The method of claim 1 wherein said SyAF pinned layer is formed by a method further comprising:

forming a first layer of ferromagnetic material on said ~~bottom~~ antiferromagnetic pinning layer;

forming a coupling layer on said first ferromagnetic layer;

forming a second layer of ferromagnetic material on said coupling layer.

5.(original) The method of claim 4 wherein said first and second ferromagnetic layers are layers of Co, Ni, Fe or their alloys or CoFeB, formed to thicknesses between approximately 5 and 100 angstroms

6.(original) The method of claim 4 wherein said coupling layer is a layer of Ru, formed to a thickness between approximately 7 and 8 angstroms or a layer of Rh formed to a thickness between approximately 5 and 6 angstroms.

7.(original) The method of claim 1 wherein said tunneling barrier layer is a layer of Al_2O_3, ZrO_2, AlN, HfO_2 or multilayers thereof and said tunneling barrier layer is formed to a thickness between approximately 3 and 30 angstroms.

8.(original) The method of claim 1 wherein said ferromagnetic free layer is a layer of Co, Ni, Fe or their alloys, CoFeB, CoZrB, CoTaB or CoHfB formed to a thickness between approximately 3 and 300 angstroms.

9.(original) The method of claim 1 wherein said top antiferromagnetic layer is a layer of IrMn, RhMn, RuMn, OsMn, FeMn, FeMnCr, FeMnRh, CrPtMn, TbCo, NiMn, PtMn or PtPdMn and it is formed to a thickness to optimize the uniaxial anisotropy of the ferromagnetic free layer.

10.(original) The method of claim 9 wherein said top antiferromagnetic layer is a layer of IrMn, RhMn, RuMn, OsMn, FeMn, FeMnCr, FeMnRh, CrPtMn, TbCo, NiMn, PtMn or PtPdMn formed to a thickness between approximately 2 and 20 angstroms.

11.(original) The method of claim 1 wherein said annealing comprises raising the MTJ structure to a temperature between approximately 100^0C and 400^0C for a time between approximately 0.5 and 20 hours in an external magnetic field between approximately 100 and 20,000 Oe.

12.(original) The method of claim 1 wherein said patterning produces a circular horizontal cross-section with a diameter of approximately 1.0 microns or less.

13.(original) The method of claim 1 wherein said substrate is a planarized layer of insulation containing therein a conducting word line and wherein said MTJ structure is formed substantially over said word line.

14.(original) The method of claim 13 wherein a bit line is formed over said MTJ structure in a direction orthogonal to said word line.

Claims 15 and 16 are canceled.